Peter A. Sayegh

646-679-0959 | pas2232@columbia.edu | linkedin.com/in/peterasayegh | github.com/peter-sayegh | peter-sayegh.github.io/my-portfolio

Education

Columbia University, Columbia Engineering — Expected Dec 2026
M.S. in Electrical Engineering, Nikola Tesla Scholarship, GPA: 3.79/4.0 — *New York, NY*

- **Coursework:** Advanced Analog Integrated Circuits, MOS Transistors, Analog-Digital Interfaces in VLSI, Power Electronics, Digital Signal Processing, Embedded AI, Microwave Circuit Design, Motor Drive Systems, High-Frequency Magnetics Design
- **Activities:** Lead Department Representative for Electrical Engineering, Engineering Student Graduate Council (EGSC)

École Polytechnique — Jun 2025
B.S. in Mathematics and Physics, GPA: 3.75/4.0 — *Palaiseau, FR*

- **Coursework:** Convex Optimization, Stochastic Processes, Electrodynamics, Adv. Quantum Physics, Thermodynamics, Statistical Physics, Condensed Matter, Algorithms, Numerical Analysis, Object-Oriented Programming, Machine Learning

Electrical Engineering Projects

Fully Differential Switched-Capacitor Amplifier — Feb – May 2026

- Designed a folded-cascode OTA with switched-capacitor CMFB in 0.18 μm CMOS: 56.6 dB gain, 69° phase margin, 487 μW
- Met 0.09% settling error in a 28 ns window for a 7-bit 16 MHz pipelined ADC, at 0.24 pJ/step

250 MS/s 8-bit Current-Steering DAC — Feb – May 2026

- Designed a 3+5 segmented current-steering DAC in 0.18 μm CMOS: 1.53 $V_{pp,diff}$ into 100 Ω at 250 MS/s, 27.6 mW
- Sized 255 unit cells to 0.67% $\sigma(I)/I$ mismatch, bounding 3σ DNL under 0.65 LSB; SFDR $\geq$ 60 dB across corners

SignSpeak: ASL Recognition on Microcontroller — Feb – May 2026

- Deployed a 16K-parameter depthwise-separable CNN on ESP32-S3 (TFLite Micro, INT8): 97.4% accuracy in 67.4 KB flash
- Built a full on-device inference pipeline from camera capture to OLED display, <110 ms latency with no cloud dependency

Experience

Illumination Diagnostics — Jun – Aug 2026
Electrical Engineering Intern — *New York, NY*

- Developed a heart-rate extraction pipeline sampling 12 optical channels at 31 Hz, achieving 1–3 bpm agreement against reference
- Prototyped PPG and temperature acquisition systems using ESP32 microcontrollers with synchronized respiration belt recording
- Assembled a 940 nm IR LED illumination array on perfboard (∼14 mA/LED) to provide stable background illumination
- Designed a 2-axis pan/tilt laser targeting system (dual servos, Arduino + Waveshare driver), achieving <0.1° angular resolution

Columbia Engineering — Sep 2026 – Present
Course Assistant, Digital Signal Processing — *New York, NY*

- Hold weekly office hours and review sessions; grade homework, exams, and projects (Prof. Guido Jajamovich)

Research

Levitation and Stability in Maglev Systems — Feb 2024 – Jul 2026
École Polytechnique, Center for Theoretical Physics — *Palaiseau, FR*

- Derived a closed-form dipole-layer force model for a scaled maglev prototype, fitting 24 gap-versus-load measurements ($R^2 = 0.96$) and predicting the unloaded levitation gap within 0.4 mm
- Extrapolated to the Transrapid TR08, showing that a ∼1.37 T magnet remanence supports its 574-passenger nominal capacity
- First-author paper published in the *European Journal of Physics* (2026), doi:10.1088/1361-6404/aeaab7

Bachelor's Thesis: Rogue Waves with Physics-Informed Neural Networks — Jan – Mar 2025
École Polytechnique, Hydrodynamics Laboratory (LadHyX) — *Palaiseau, FR*

- Built a physics-informed neural network in JAX to solve the nonlinear Schrödinger equation for rogue waves, reaching 4.84×10^{-3} average L^2 error with causal training and residual-based adaptive sampling
- Implemented a split-step Fourier spectral solver with $O(dt^3)$ error scaling as the benchmark, validated against analytical dark-soliton solutions with energy conservation error below 10^{-5}

Technical Skills

CAD: Cadence Spectre, Virtuoso, ADE; KLayout, Xschem, ngspice; LTSpice, PLECS, Simulink; Keysight ADS; Ansys Maxwell
Lab and Test: Oscilloscope, function generator, DMM, soldering and rework, perfboard prototyping, benchtop characterization
Programming: Python, C++, MATLAB, Arduino, R
ML and Scientific Computing: TensorFlow, Keras, JAX/Optax, scikit-learn, NumPy, SciPy, pandas, PySpice
Languages: French (native), Arabic (native), German (advanced), Spanish (intermediate)